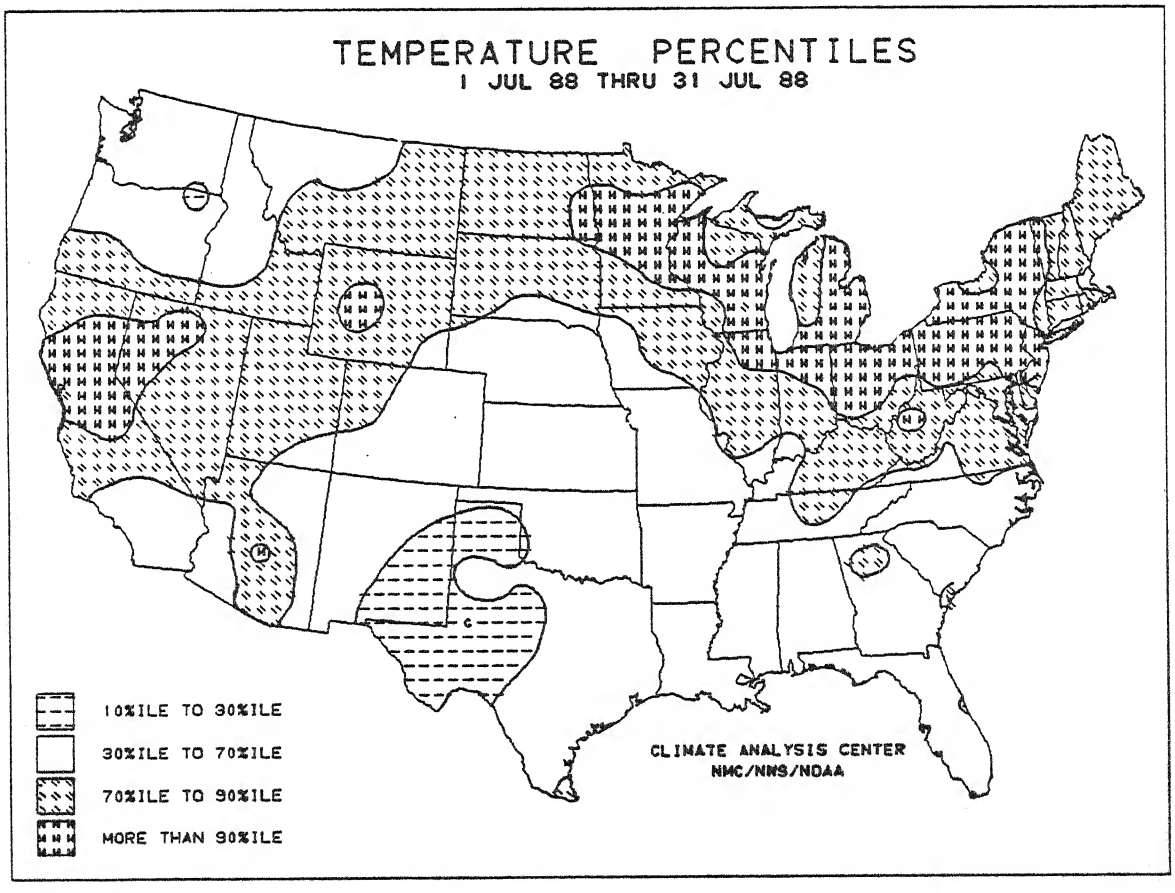
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

No. 88/32 Washington, DC August 6, 1988



IN RECENT TIMES, JULY 1988 WAS ONE OF THE WARMEST MONTHS BOTH STATISTICALLY AND HISTORICALLY IN PARTS OF THE WEST, MIDWEST, AND NEW ENGLAND REGIONS. FOR ADDITIONAL INFORMATION, REFER TO THE SPECIAL CLIMATE SUMMARY ON THE U.S. MONTHLY REVIEW.

NOAA - NATIONAL WEATHER SERVICE - NATIONAL METEOROLOGICAL CENTER

WEEKLY CLIMATE BULLETIN

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This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

Highlights of major global climatic events and anomalies.
U.S. climatic conditions for the previous week.
U.S. apparent temperatures (summer) or wind chill (winter).
Global two-week temperature anomalies.
Global four-week precipitation anomalies.
Global monthly temperature and precipitation anomalies.
Global three-month precipitation anomalies (once a month).
Global twelve-month precipitation anomalies (every 3 months).
Global temperature anomalies for winter and summer seasons.
Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF AUGUST 6, 1988
(Approximate duration of anomalies is in brackets.)

1. United States and Eastern Canada:
HEAT CONTINUES; DRYNESS SLIGHTLY IMPROVED.
Very warm conditions continued in the north-central and northeastern United States and eastern Canada while temperatures declined somewhat in the western United States. Temperatures up to 7°C (13.2°F) above normal were reported in the eastern sections while parts of the West were actually below normal for the week. Scattered heavy precipitation of over 100 mm (3.9 inches) fell on the Gulf Coast States and the upper Mississippi Valley, but most of the East and Midwest received light (less than 25.4 mm (1 inch)) precipitation as the long-term drought persisted [21 weeks dry - 14 weeks warm].

2. China:
HIGHLY VARIABLE PRECIPITATION PATTERNS CONTINUE.
While parts of north-central China (Shanxi and Shaanxi provinces) were inundated with torrential downpours (up to 200 mm (7.8 inches)), much of east-central China remained abnormally dry as the majority of Hubei and Sichuan provinces received less than 20 mm (0.8 inches). According to press reports, unseasonably hot weather, with highs exceeding 41.1 °C (104°F), occurred in the latter area, further aggravating the dry conditions [9 weeks].

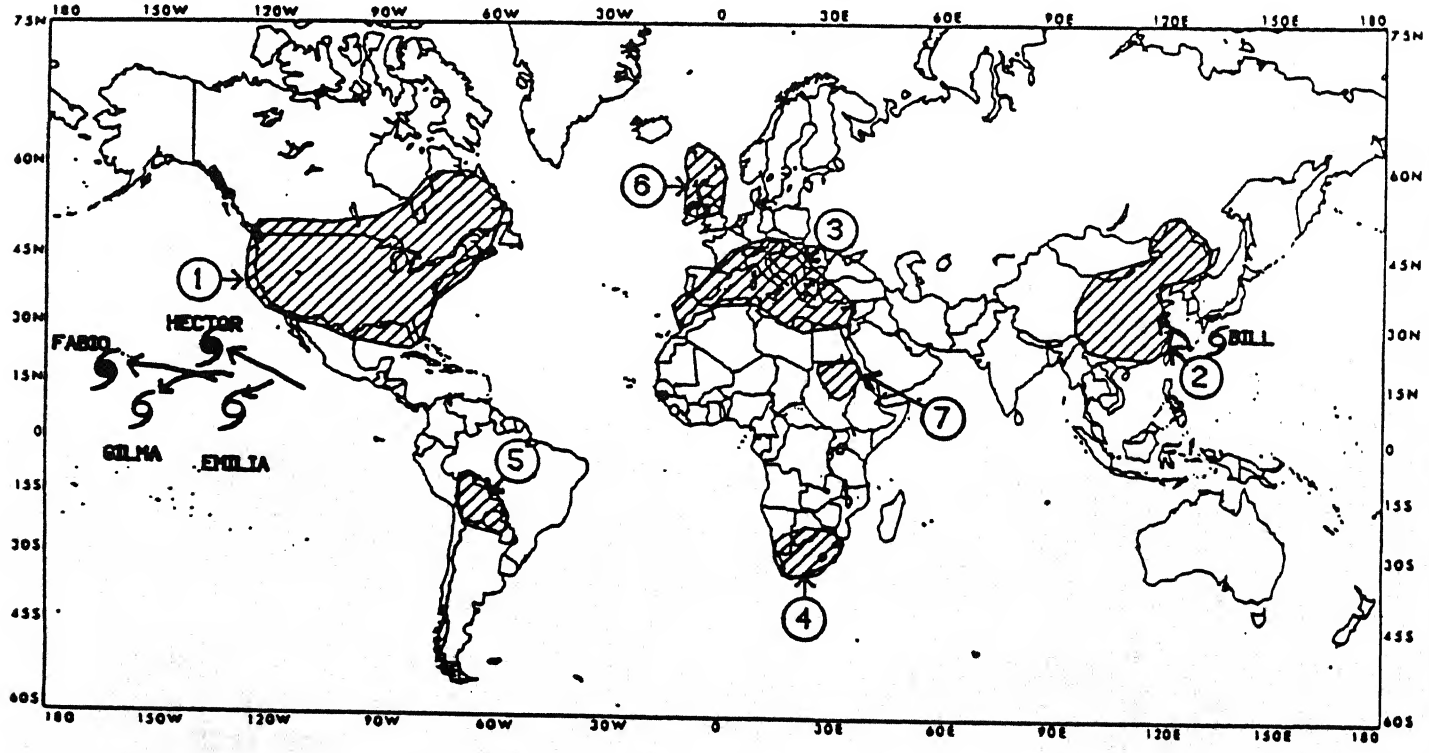
3. Southern Europe and Northern Africa:
ABOVE NORMAL TEMPERATURES CONTINUE.
Temperatures averaged as much as 5.5°C (9.9°F) above normal throughout the region as the heat wave continued [6 weeks].

4. South Africa:
VERY WARM CONDITIONS DEVELOP.
Unusually high temperatures, as much as 5.6°C (10.1°F) above normal developed in the region and persisted throughout the week [2 weeks].

5. Bolivia and Paraguay:
CONTINUED UNUSUALLY COOL
Temperatures as much as 4.4°C (7.9°F) below normal were common across the region as the spell of unusually cold weather persisted [5 weeks].

6. British Isles:
HEAVY RAINS DIMINISH.
Light rain, generally under 10 mm (0.4 inches), fell across the Isles, easing abnormally wet conditions [6 weeks].

7. Sudan:
TORRENTIAL DOWNPOURS PRODUCE FLOODING.
Heavy upstream precipitation produced the worst flooding since 1946 in the eastern river cities of Khartoum, Kassala, and Shuwak, and the northern river city of Ad-Damir, according to press reports [Episodal Event].



Approximate locations of the major anomalies and events described above are shown on this map. See the other world maps in this Bulletin for current two-week temperature anomalies, four-week precipitation anomalies, and (occasionally) longer-term anomalies.

U.S. WEEKLY WEATHER HIGHLIGHTS

FOR THE WEEK OF JULY 31 THROUGH AUGUST 6, 1988

Strong thunderstorms, in association with a cold front, dropped heavy precipitation on portions of the northern Great Plains and upper Midwest, while showers from tropical moisture brought significant rainfall to scattered locations along the eastern half of the Gulf Coast, the southern Atlantic Coast states, and the upper Rio Grande Valley and southern Rockies (see Table 1). According to the River Forecast Centers, over four inches fell in the western Florida Panhandle, southern Mississippi, and southwestern Louisiana. In addition, two to four inches were recorded in sections of eastern Arizona, southern New Mexico, and southwestern Texas, in northern Nebraska, eastern South Dakota, central Minnesota, northern Wisconsin, and the Upper Peninsula of Michigan, and at various locations in northern Florida, Georgia, South Carolina, and the eastern halves of Tennessee and North Carolina. Light to moderate amounts were observed along the central California coast and throughout most of the eastern three-quarters of the nation. The few areas that reported little or no precipitation included the seasonably dry Pacific Coast and Intermountain Region, and the northern Rockies, upper Missouri Valley, the panhandles of Texas and Oklahoma, eastern Oklahoma and western Arkansas, and scattered stations along the Middle Atlantic Coast. Overall, most locations in the Midwest and Southeast received light to moderate precipitation last week, but far more rainfall is still needed to significantly reduce the long-term moisture deficits.

The warm weather shifted eastward from the previous week and was centered over the Great Lakes and New England. Greatest departures above normal (between +9 to +13°F) were found in Wisconsin, eastern Iowa, northern Illinois and Indiana, lower Michigan, and in Vermont, New Hampshire, and Maine (see Table 2). Several stations in both areas established new daily record maximum temperatures during the week as highs exceeded 100°F in parts of the Great Plains, Midwest, and lower Mississippi Valley. Readings hit 105°F at La Crosse, WI, Pickstown, SD, Waterloo, IA, Williston, ND, and Minneapolis, MN, 106°F at Huron, SD, 107°F at Redwood Falls, MN and Sioux Falls, SD, and 108°F at Pierre, SD. Elsewhere, slightly above normal temperatures prevailed in much of Alaska and Hawaii, in northern Washington, the Great Basin, the northern Great Plains and central Rockies, and throughout most of the eastern half of the country. In contrast, cooler conditions persisted in portions of the western and southern U.S., most notably in eastern Oregon and western Idaho, the central California coast, and from southern Arizona southeastwards to the central Rio Grande Valley, where departures ranged from -3 to -6°F (see Table 3). Other areas that experienced slightly below normal temperatures included the northern Rockies, parts of the Intermountain Region, the southern thirds of the Rockies and Great Plains, and sections of the eastern Gulf Coast.

TABLE 1. Selected stations with two or more inches of precipitation for the week.

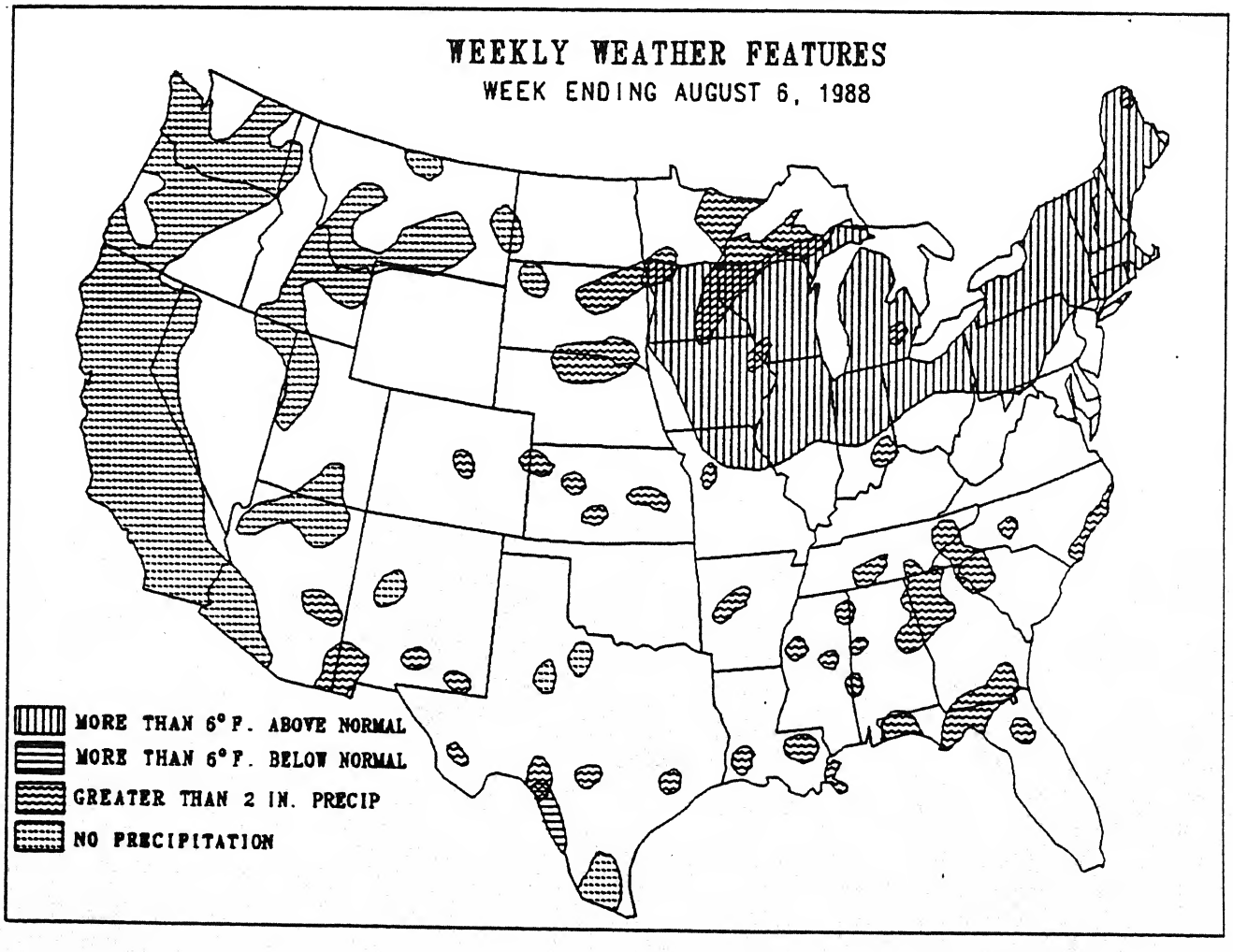
Milton/Whiting, FL	4.56	Douglas, AZ	2.45
Valparaiso/Elgin, FL	4.37	Cape Hatteras, NC	2.44
Marquette, MI	4.02	Minneapolis, MN	2.43
Gwinn/Sawyer AFB, MI	3.76	Lake Charles, LA	2.42
Baton Rouge, LA	3.56	Colorado Springs, CO	2.41
Apalachicola, FL	3.49	Duluth, MN	2.36
Wilmington, NC	3.44	Alamogordo/Holloman AFB, NM	2.35
Hibbing, MN	3.18	Carlsbad, NM	2.31
Park Falls, WI	3.12	New Orleans/Lake Front, LA	2.26
Valdosta, GA	3.10	Tallahassee, FL	2.19
Pensacola, FL	3.05	Cherry Point, NC	2.18
Goodland, KS	2.99	Knoxville, TN	2.16
Del Rio/Laughlin AFB, TX	2.97	Atlanta, GA	2.16
Hancock/Houghton Co., MI	2.91	Caribou, ME	2.07
New Orleans NAS, LA	2.84	Hilo/Lyman, Hawaii, HI	2.07
Valentine, NE	2.75	Alexandria, MN	2.02
Aberdeen, SD	2.74	South Bend, IN	2.02
Gainesville, FL	2.48	Deming, NM	2.00
Chattanooga, TN	2.45		

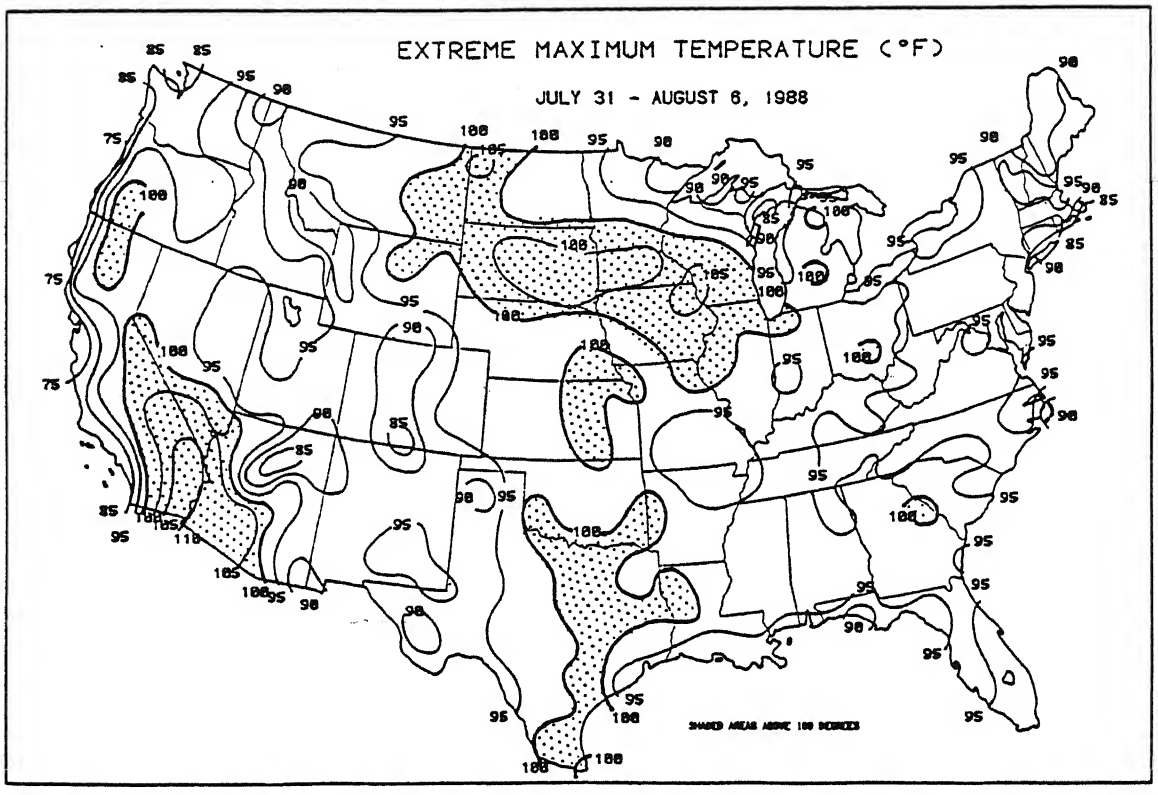
TABLE 2. Selected stations with temperatures averaging greater than 8°F ABOVE normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Milwaukee, WI	+13	84	Concord, NH	+10	79
South Bend, IN	+12	84	Wausau, WI	+10	79
Lansing, MI	+12	82	Augusta, ME	+10	79
Lebanon, NH	+12	80	Portland, ME	+10	78
La Crosse, WI	+11	84	Mt. Washington, NH	+10	49
Detroit, MI	+11	83	Ottumwa, IA	+ 9	85
Madison, WI	+11	82	Quincy, IL	+ 9	85
Burlington, VT	+11	80	Peoria, IL	+ 9	84
Green Bay, WI	+11	80	Moline, IL	+ 9	84
Rumford, ME	+11	78	Cedar Rapids, IA	+ 9	83
Houghton Lakes, MI	+11	78	Rockford, IL	+ 9	82
Alpena, MI	+11	78	Toledo, OH	+ 9	81
Montpelier, VT	+11	77	Grand Rapids, MI	+ 9	81
Chicago/O'Hare, IL	+10	83	Saginaw, MI	+ 9	80
Waterloo, IA	+10	83	Rochester, MN	+ 9	79
Eau Claire, WI	+10	81	Glens Falls, NY	+ 9	78
Muskegon, MI	+10	80	Bangor, ME	+ 9	77
Flint, MI	+10	80	Pellston, MI	+ 9	75

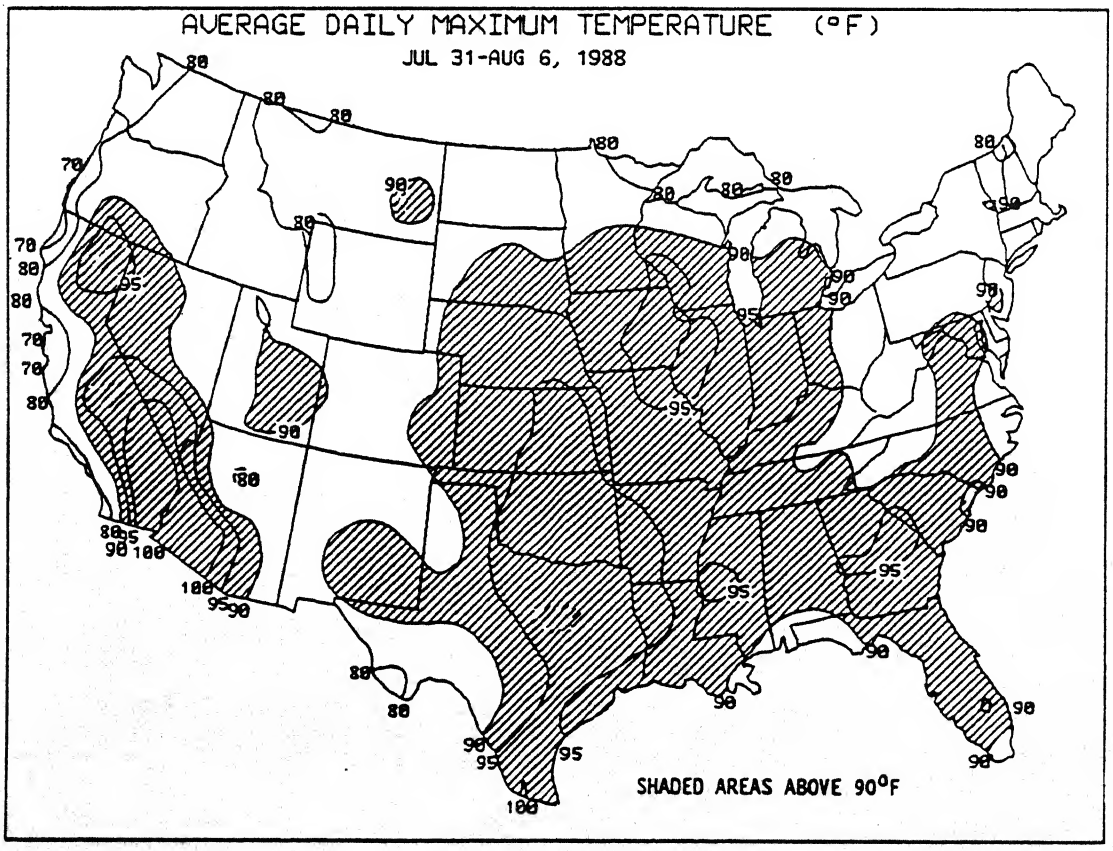
TABLE 3. Selected stations with temperatures averaging greater than 3°F BELOW normal for the week.

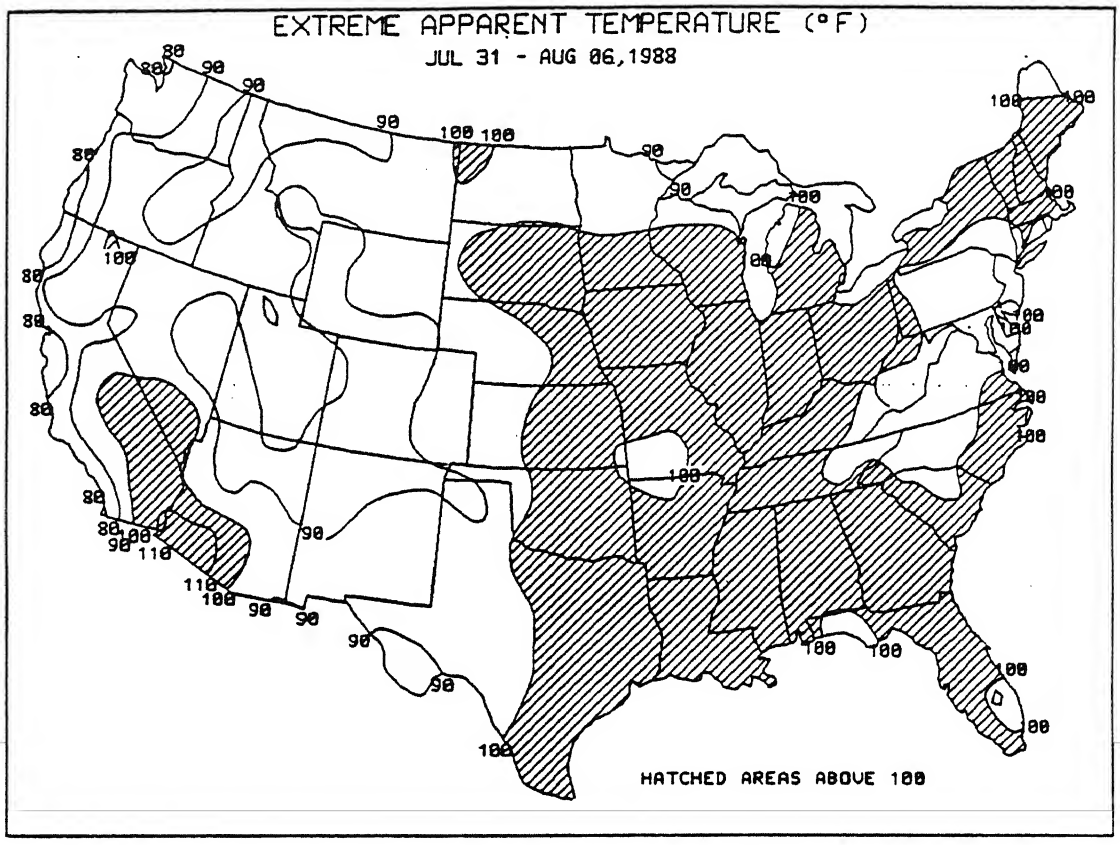
Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Meacham, OR	-7	57	Midland, TX	-4	78
Del Rio, TX	-6	80	El Paso, TX	-4	78
Burns, OR	-5	65	Deming, NM	-4	75
Junction, TX	-4	80	Stockton, CA	-4	73
San Angelo, TX	-4	80	Paso Robles, CA	-4	71



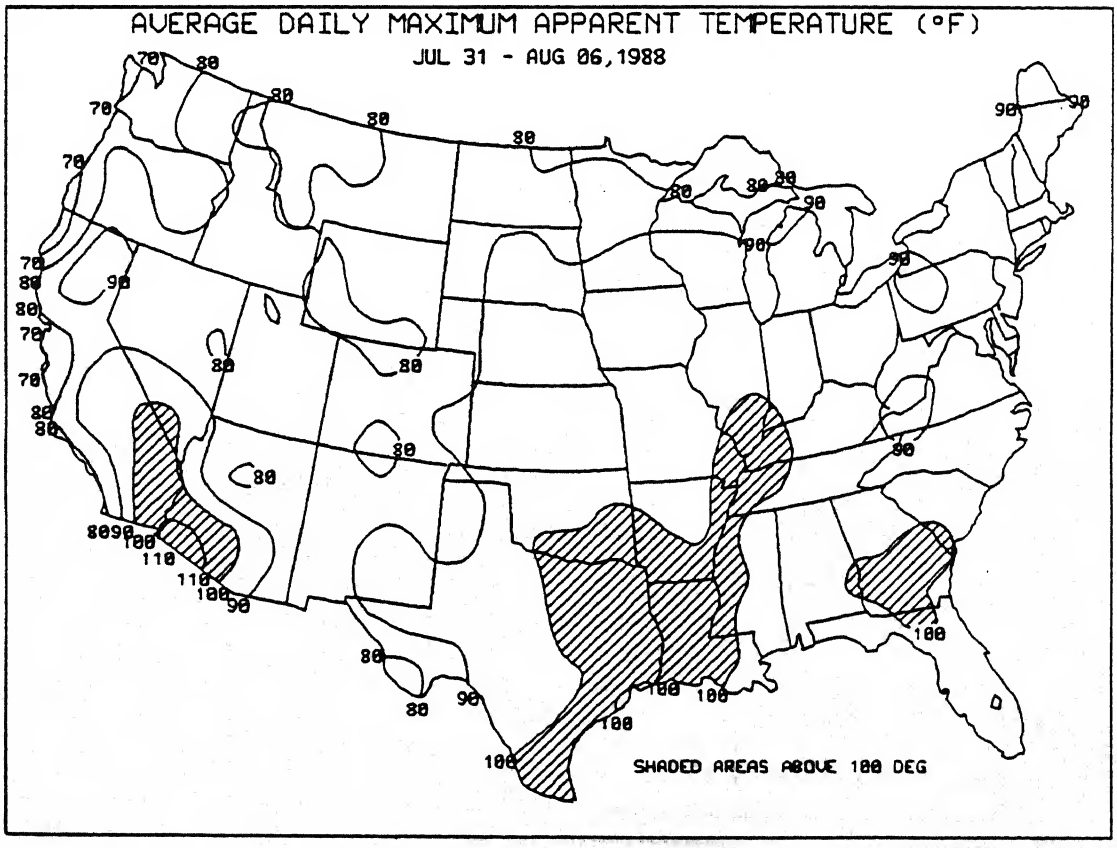


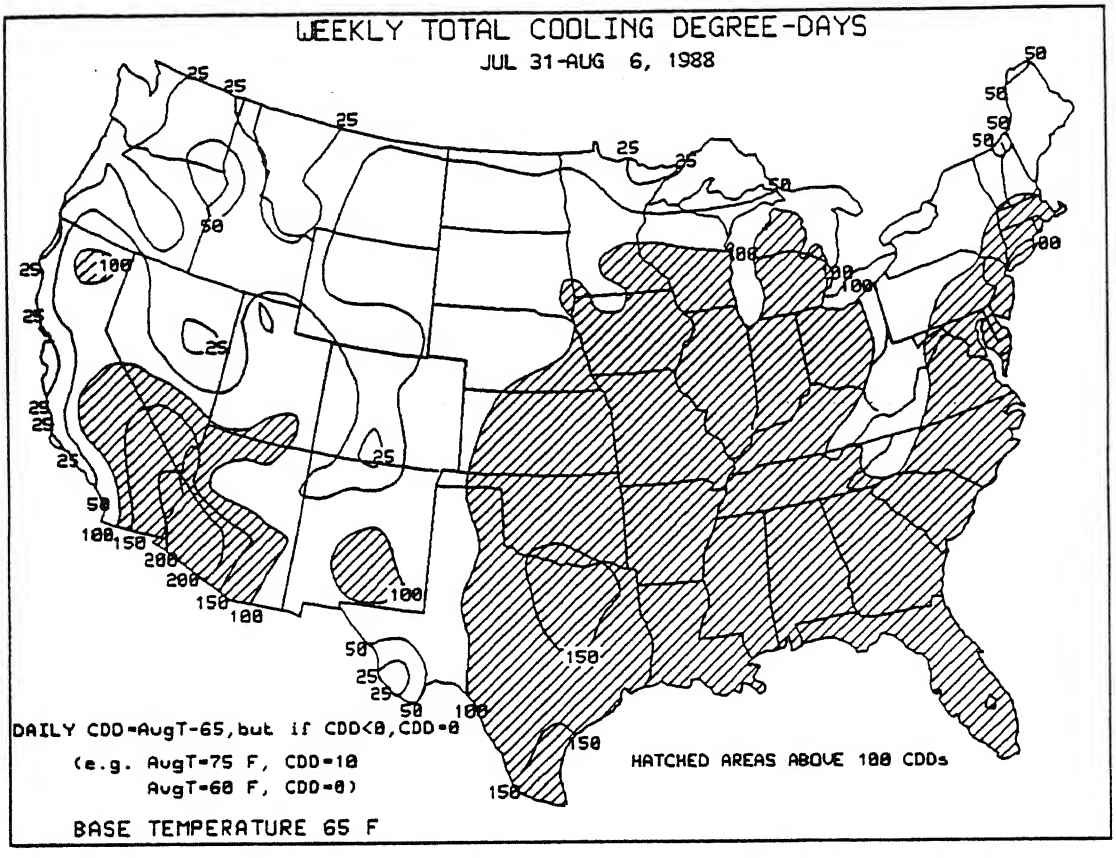
Highs surpassed 100°F in the Great Plains, Midwest, and lower Mississippi Valley as abnormally hot weather covered the Great Lakes and New England regions (top). Maximum temperatures averaged in the mid to upper nineties in parts of the Midwest, southern Great Plains, and Southeast (bottom).



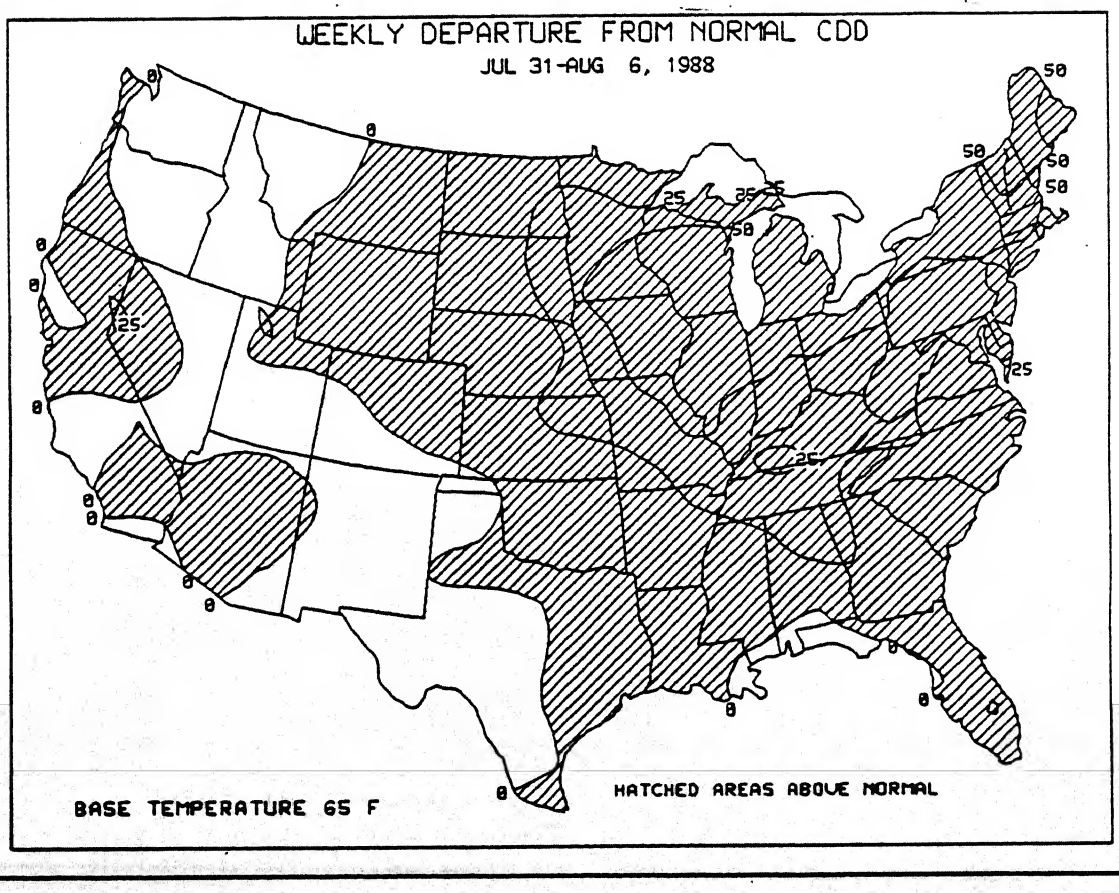


Much of the eastern half of the U.S. experienced dangerous (>=105°F) apparent temperatures at least once last week (top), while persistently hot weather and high humidity produced average daily maximum apparent temperatures of 100°F or more in the lower Mississippi Valley (bottom).



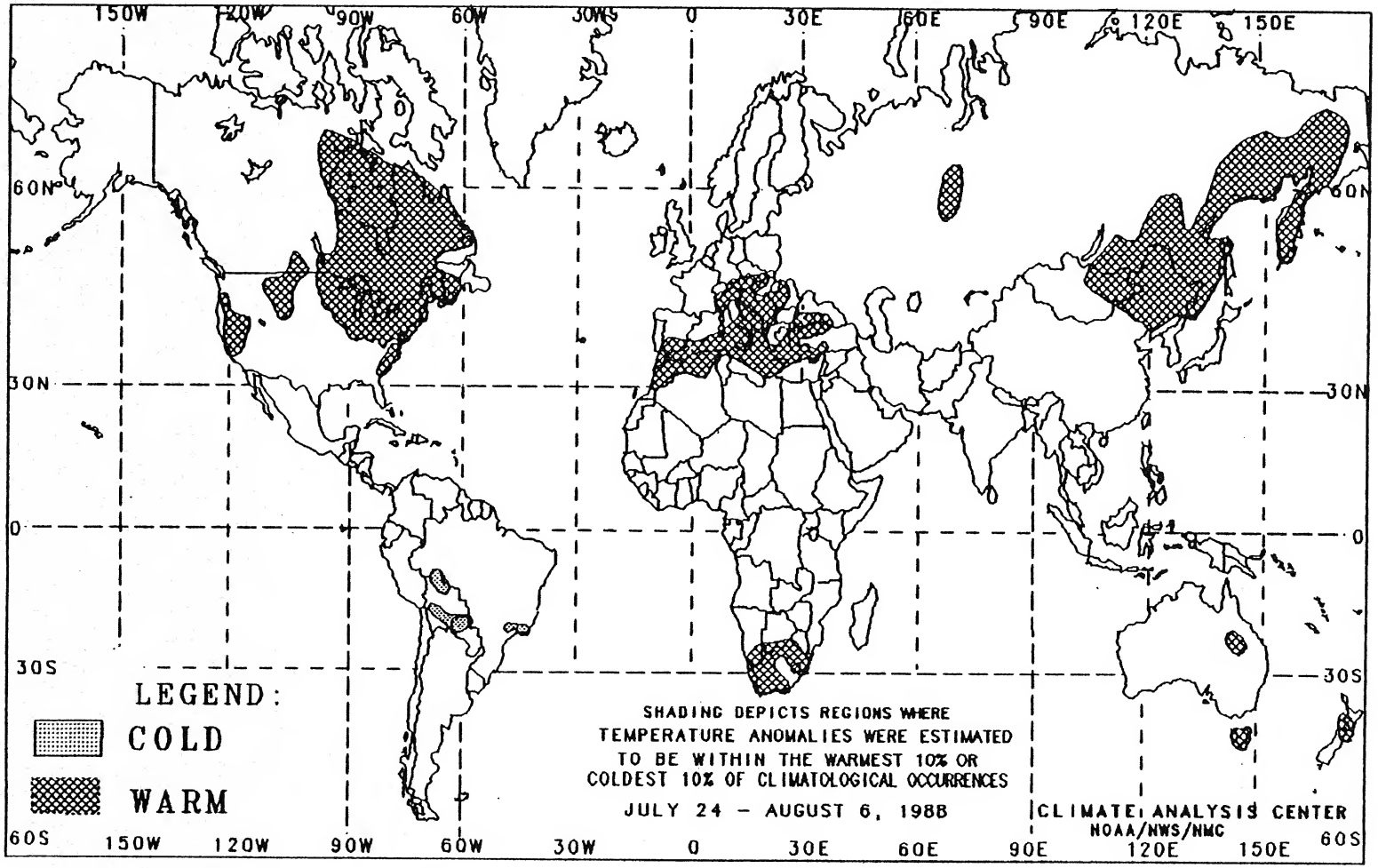


Continued warmth throughout much of the country pushed weekly CDD demand over 100 in the eastern U.S. (top), while the greatest air conditioning demand above normal occurred in the Great Lakes and New England regions (bottom).



GLOBAL TEMPERATURE ANOMALIES

2 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

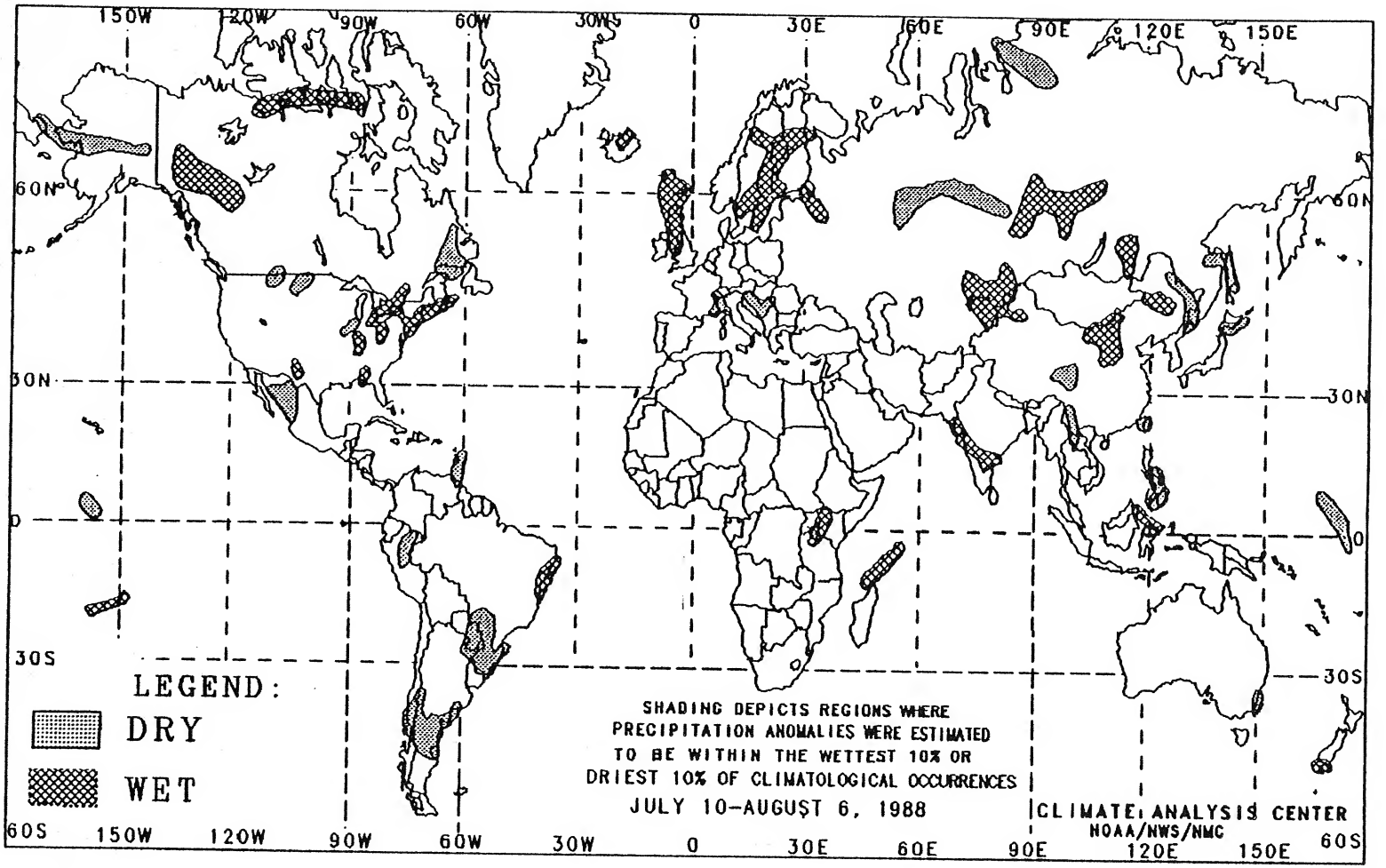
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

Climate Analysis Center, NMC
National Weather Service, NOAA

UNITED STATES CLIMATE SUMMARY FOR THE MONTH OF JULY 1988

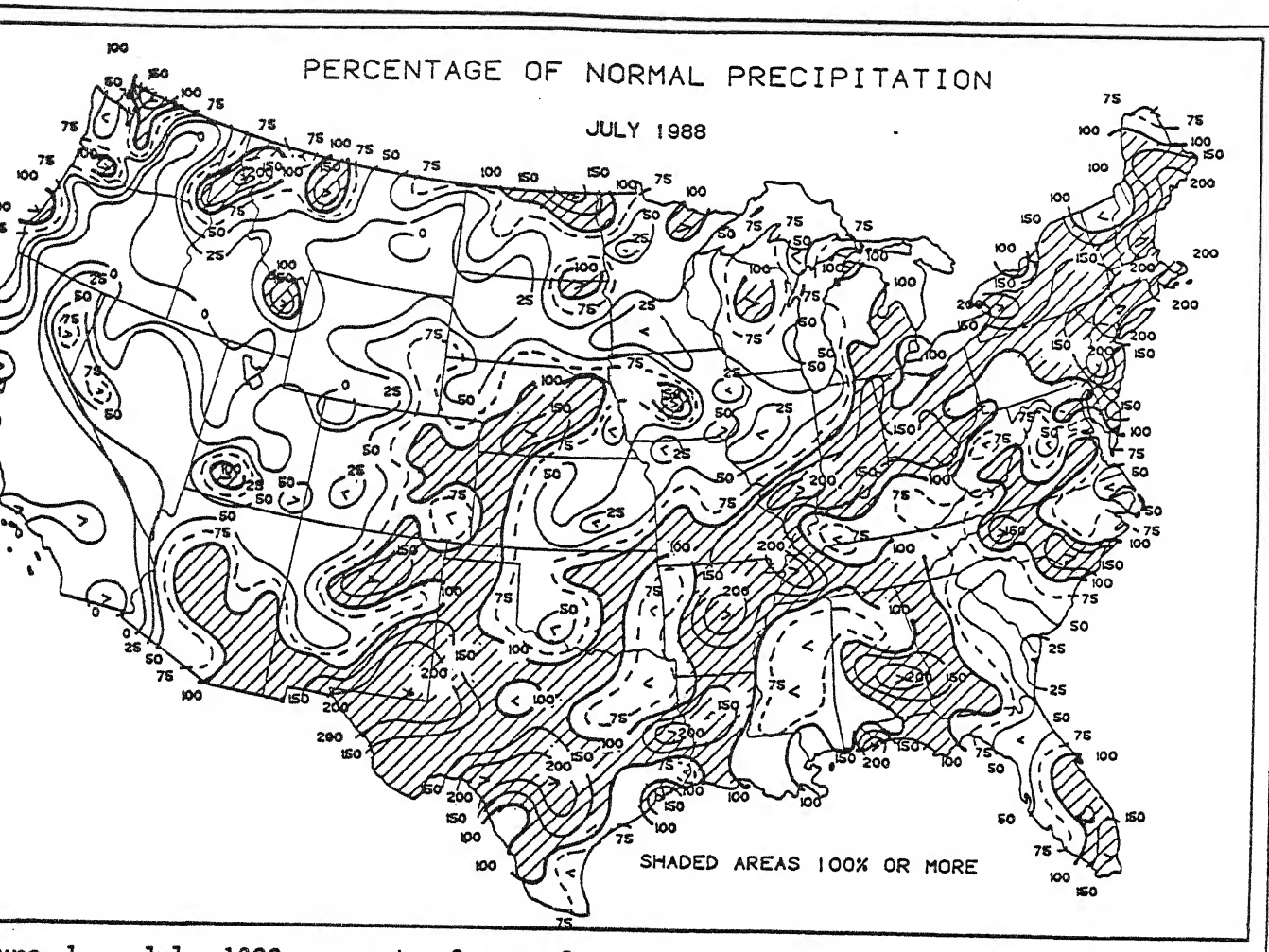
The climatic features for July, 1988 included widely fluctuating precipitation patterns with abnormally wet conditions in the southern Rockies and Great Plains, lower Mississippi and Ohio Valleys, and New England regions, unseasonably dry weather in parts of the central and northern Great Plains, Midwest, and Southeast, near to record-setting warmth in portions of south-central Alaska, the Far West, Midwest, and New England areas, and below normal temperatures in the Pacific Northwest Interior, the southern Rockies and Great Plains, and sections of the Southeast.

Most of the eastern half of the U.S. received a respite from several months of below normal precipitation as excessive rains fell on central Alabama and western Georgia, southeastern Florida, northern Louisiana, central Arkansas, western Tennessee, southern Missouri, throughout the Ohio Valley, and in much of New England (see Figures 1, 2 and Table 1). A few stations in New England, the Southeast, and mid-Atlantic set new maximum July precipitation amounts (see Table 5), while several other locations, especially along coastal New England, reported one of their largest July totals since 1951 (see Figure 3). According to the River Forecast Centers, over eight inches was measured at scattered sites in southern Illinois, Indiana, and central Ohio, and in eastern Pennsylvania, western New Jersey, southern New York, western Connecticut, central Massachusetts, southern Vermont, and extreme southern Maine. Additionally, more than ten inches fell at stations along the Gulf Coast from Louisiana eastward to western Florida, in central Alabama, western Tennessee, northern Mississippi, the Missouri Bootheel, and southeastern Florida, while amounts of 14-16 inches were found in south-central Texas and southeastern North Carolina. Elsewhere, above normal rainfall occurred in the northern Cascades, along portions of the Oregon Coast, in the northern and southern Rockies, in parts of the Dakotas, the central sections of Nebraska, Iowa, and Wisconsin, western Kansas, and in extreme southeastern Alaska. The precipitation provided short-term relief from the drought in the lower Mississippi, Tennessee, and Ohio Valleys, but long-term deficiencies of 4-8 inches since April 1 still remained.

In contrast, parts of the eastern U.S. observed subnormal July rainfall (see Table 2). Much of southern Minnesota and Wisconsin, eastern Iowa, northern Missouri and Illinois, the upper Missouri Valley, and sections of Mississippi, Kentucky, South Carolina, and Florida experienced little or no short-term alleviation from the drought during July as deficits of 8-12 inches continued to accumulate from the past four months. In the normally dry West, very little, if any, precipitation occurred in the desert Southwest, southern Pacific Coast, and northern Intermountain Region, while less than normal rainfall was observed throughout the Great Basin, the central Rockies, and the north-central Great Plains. The combination of abnormally dry conditions during the winter and summer months and the record-breaking warmth since this Spring had increased the risk of forest fires in the West and unfortunately, a large number of outbreaks, most notably in Yellowstone Park, did occur during July and burned several thousands of acres.

Wide-spread warmth continued across most of the western, northern, and eastern U.S., with the greatest departures (more than $+4^{o}F$) centered over the western Great Basin, north-central Rockies, upper Midwest, Great Lakes, and New England regions (see Table 3, Figure 4, front cover). Many stations reached or surpassed $100^{o}F$, not uncommon during one of the warmest months of the year, however, the number of days that the temperatures exceeded $99^{o}F$ in the upper Midwest, Great Lakes, mid-Atlantic, and central California/southern Oregon areas was noteworthy (see Figure 5). Furthermore, locations in the West, upper Midwest, and Ohio Valley established new record July average temperatures (see Figure 6 and Table 6), and 38 stations throughout the nation broke extreme maximum temperatures for July (see Table 7). Regionally, the Middle Atlantic (NY, PA, NJ), the East North Central (WI, IL, IN, OH, MI), and New England (ME, NH, VT, MA, CN, RI) recorded their third, sixth, and seventh warmest July, respectively, since 1931 (58 years).

A cool, Canadian air mass invaded the eastern third of the country during the first days of July as several stations set new extreme minimum temperatures (see Table 7), but warm, tropical air dominated the area during the remainder of the month. Only in the southern Rockies, south-central Great Plains, interior Pacific Northwest, and from southwestern Missouri southeastwards to central Florida did July's temperatures average below normal (see Figure 4). The largest departures ($-2^{o}F$ or less) occurred in eastern New Mexico, western Texas, and the Oklahoma Panhandle (see Table 4).



ure 1. July 1988 percent of normal precipitation. The majority of the tern U.S. received above normal monthly rainfall for the first time in eral months, however, other areas (e.g. upper Midwest) remain unusually dry.

TABLE 1. JULY STATIONS WITH MORE THAN 150% OF NORMAL PRECIPITATION AND SIX OR MORE INCHES OF PRECIPITATION; OR, STATIONS WITH MORE THAN EIGHT INCHES OF PRECIPITATION AND NO NORMALS.

Station	Total (in.)	Pct of Normal	Station	Total (In.)	Pct of Normal
Wilmington, NC	14.49	194.8	Blytheville AFB, AR	7.78	222.9
Pensacola, FL	11.77	163.7	Brunswick NAS, ME	7.63	227.1
Miami, FL	10.90	182.9	Boston/Logan, MA	7.62	286.5
Homestead AFB, FL	10.90	***	Salisbury, MD	7.39	168.0
Little Rock AFB, AR	10.78	***	Bangor, ME	7.28	212.2
Vero Beach, FL	10.29	178.7	Annette Island, AK	7.15	152.5
Montgomery, AL	9.99	209.9	Washington/Dulles, VA	7.12	204.0
Newark, NJ	9.94	259.5	Hickory, NC	7.10	165.1
Panama City/Tyndall, FL	9.74	***	New York/Kennedy, NY	6.91	194.1
Jackson, TN	9.70	218.5	Cincinnati, OH	6.85	160.4
Fayetteville/Pope, NC	8.63	***	Belleville/Scott AFB, IL	6.78	204.8
Bridgeport, CT	8.56	248.8	Midland, TX	6.68	392.9
New York/La Guardia, NY	8.47	232.1	Evansville, IN	6.63	166.6
Little Rock, AR	8.45	234.7	Concord, NH	6.53	222.9
Poughkeepsie, NY	8.44	241.1	Fort Wayne, IN	6.51	192.0
Hartford, CT	8.43	274.6	Buffalo, NY	6.35	216.0
Wilmington, DE	8.27	212.1	Wilkes-Barre, PA	6.24	186.3
Ozark/Cairns AFB, AL	8.08	***	Allentown, PA	6.17	150.1
Philadelphia, PA	8.06	209.4	Worcester, MA	6.15	171.8
South Weymouth, MA	8.02	***	Dallas/Love Field, TX	6.13	303.5
Columbus, OH	7.80	195.0			

(Note: Stations without normals are indicated by asterisks).

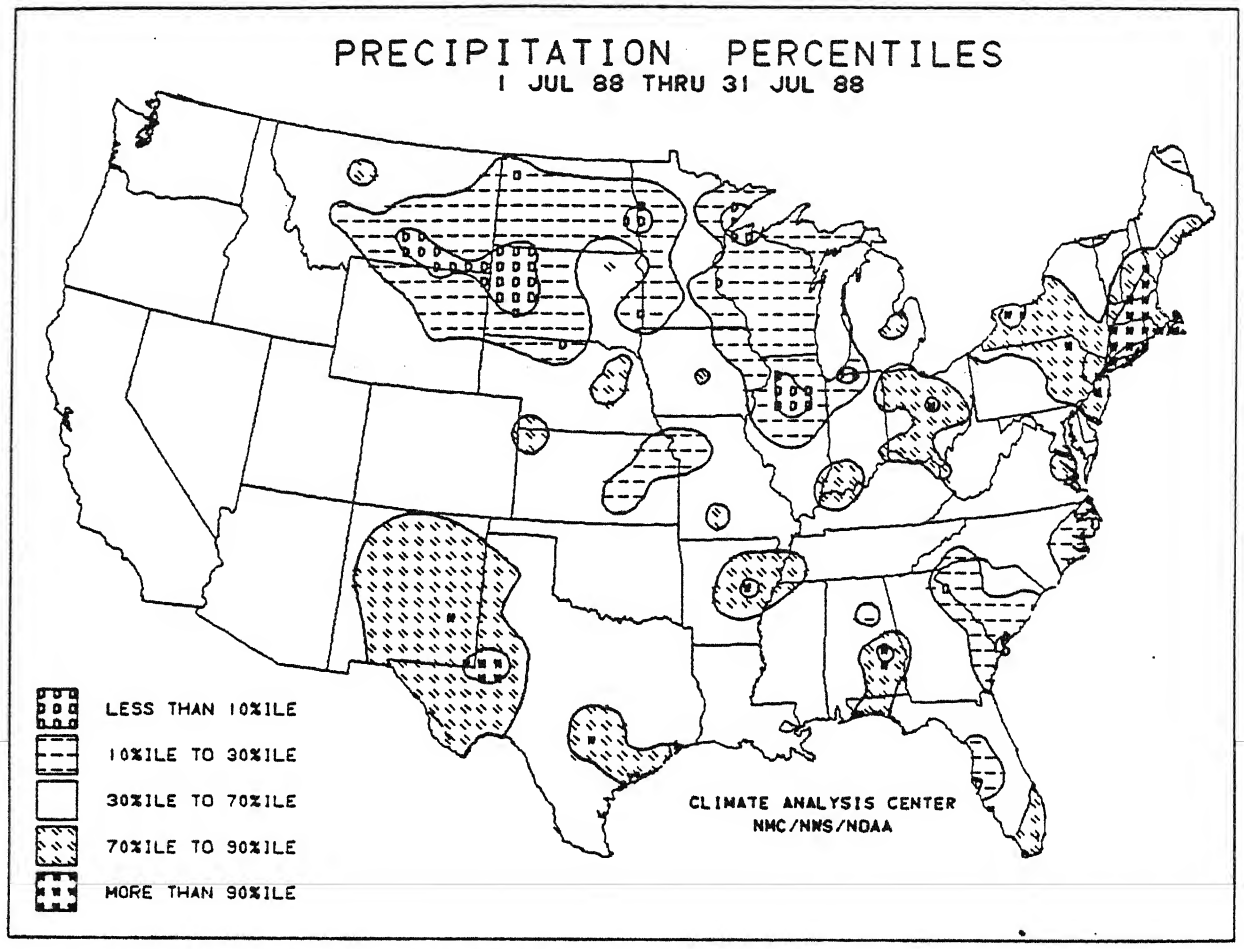


Figure 2. Precipitation percentiles for July, 1988. Statistically, not only was it one of the driest Julys in parts of the north-central Great Plains, Midwest, and southern Atlantic Coast, but also one of the wettest Julys in sections the southern Great Plains, South, and coastal New England.

TABLE 2. JULY STATIONS WITH LESS THAN 70% OF NORMAL PRECIPITATION AND FOUR OR MORE INCHES OF NORMAL PRECIPITATION.

Station	Total (in.)	%of Nml	NmlAmt (in.)	Station	Total (in.)	%of Nml	NmlAmt (in.)
Quincy, IL	0.10	2.3	4.32	Millville, NJ	2.35	58.8	4.00
Cedar Rapids, IA	0.52	11.9	4.38	Rockford, IL	2.39	53.4	4.48
Ottumwa, IA	0.84	19.0	4.42	Raleigh-Durham, NC	2.69	61.6	4.37
Mason City, IA	0.85	20.2	4.21	Jackson, MS	2.73	59.4	4.60
Brunswick, GA	0.93	15.1	6.16	Seymour-Johnson, NC	2.79	41.0	6.80
Kansas City, MO	1.21	29.4	4.11	Greenwood, MS	2.83	62.5	4.53
Waterloo, IA	1.51	32.3	4.68	Norfolk, VA	2.93	57.4	5.11
Athens, GA	1.67	32.4	5.16	Daytona Beach, FL	2.94	53.3	5.52
Topeka, KS	1.74	43.0	4.05	Birmingham, AL	3.00	55.9	5.37
Moline, IL	1.79	36.8	4.86	Charleston, WV	3.00	56.3	5.33
Savannah, GA	1.80	24.4	7.38	Chanute, KS	3.01	66.3	4.54
Hampton/Langley, VA	1.82	37.9	4.80	Columbia, SC	3.24	60.6	5.35
Augusta, GA	1.87	42.7	4.38	Cordova, AK	3.26	49.2	6.63
Oklahoma City, OK	1.88	35.1	5.35	Tampa, FL	3.40	46.4	7.33
Alexandria, MN	1.97	45.5	4.33	Sumter/Shaw AFB, SC	3.63	69.0	5.26
Greenville, SC	2.18	48.4	4.50	Port Arthur, TX	3.84	65.2	5.89
Gainesville, FL	2.19	29.9	7.33	Charleston, SC	4.13	56.5	7.31
Bluefield, WV	2.20	52.5	4.19	Fort Myers, FL	5.13	59.9	8.57
Caribou, ME	2.28	56.7	4.02	Hilo/Lyman, HI	5.51	63.6	8.66

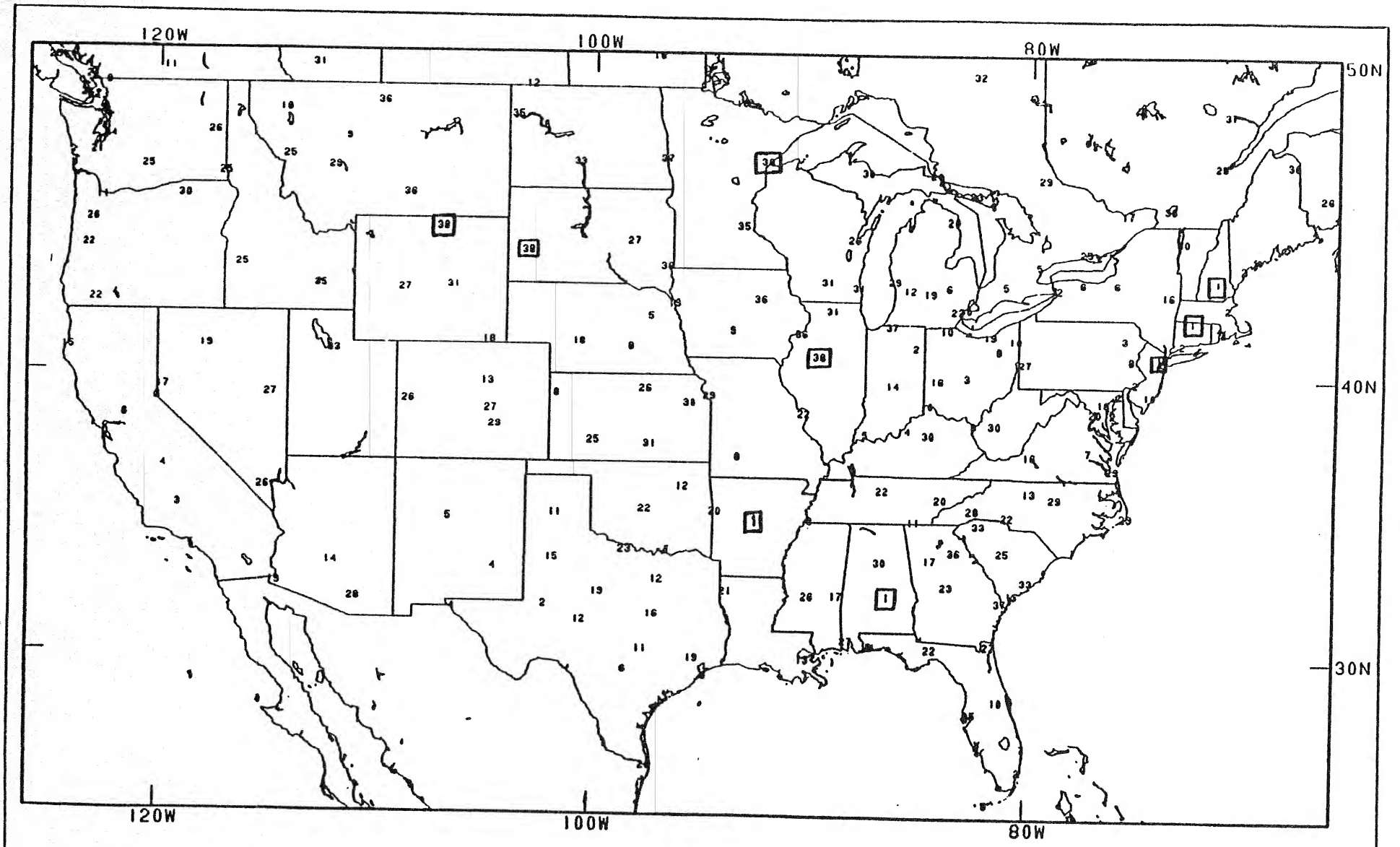


Figure 3. July 1988 precipitation rankings since 1951 (38 years). Plotted values represent the July 1988 precipitation rank of a station where 1=maximum (wettest) and 38=minimum (driest). Boxed rankings indicate record amounts over the past 38 years, however, they many not represent all-time records. For historical records, refer to Table 5. Widely varying amounts of rain fell across the eastern two-thirds of the nation (e.g. 6.51" (2) at Ft. Wayne, IN versus 1.28" (37) at South Bend, IN, only 100 miles away).

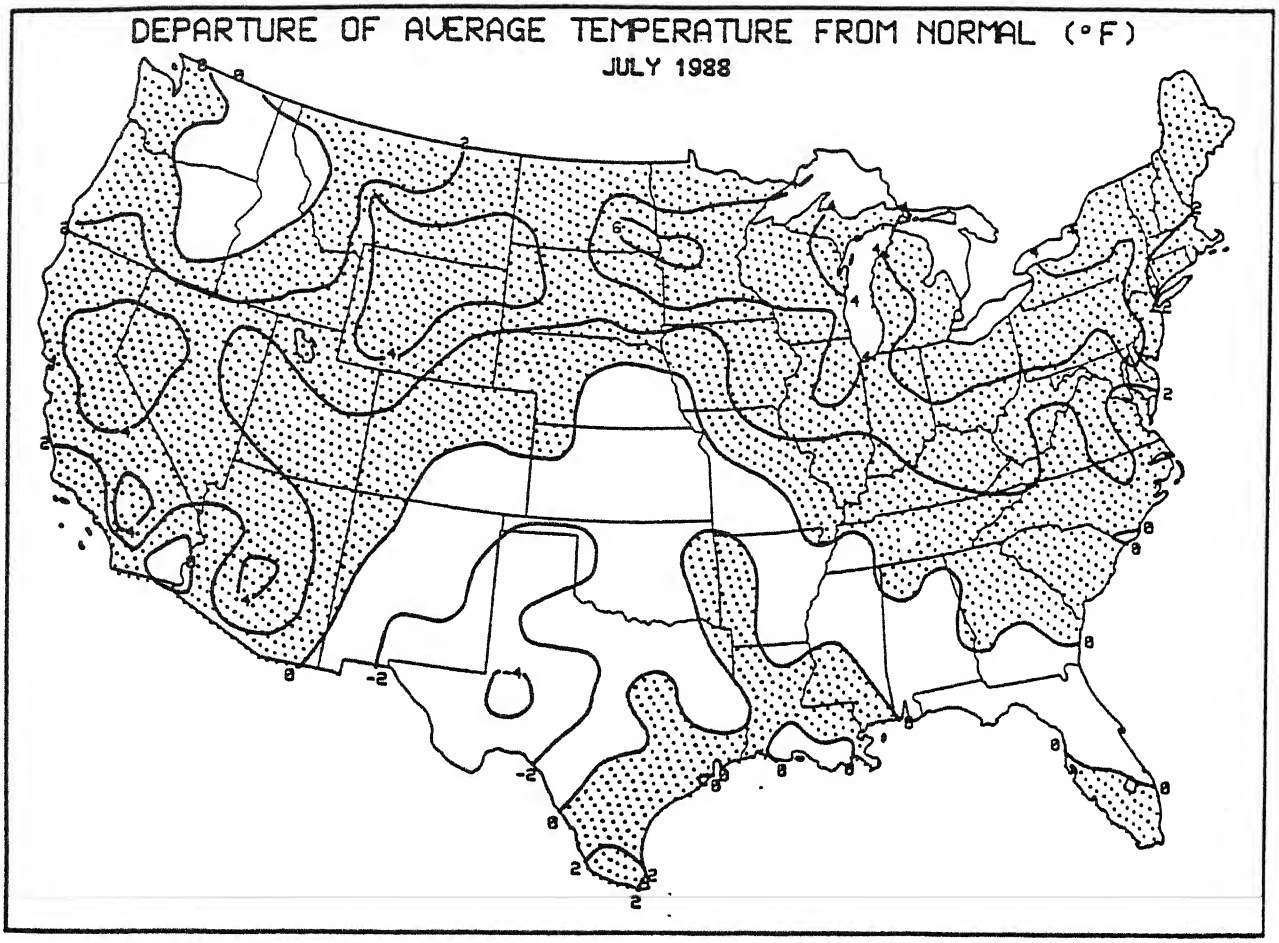


Figure 4. Departure of average temperature from normal (°F) for July 1988. Hot weather covered much of the nation, especially in central California, the Great Lakes, and New England regions.

TABLE 3. JULY AVERAGE TEMPERATURES 4.5°F OR MORE ABOVE NORMAL.

Station	Degrees F Mean	Dep	Station	Degrees F Mean	Dep
Jamestown, ND	76.1	+6.1	Minneapolis, MN	78.1	+5.0
Alexandria, MN	76.5	+5.9	Williamsport, PA	77.4	+4.9
Hancock/Houghton Co, MI	70.7	+5.9	Detroit, MI	77.2	+4.9
Aniak, AK	61.5	+5.9	Erie, PA	74.5	+4.9
Reno, NV	75.2	+5.8	Duluth, MN	70.0	+4.9
Glendale/Luke AFB, AZ	96.6	+5.6	Pittsburgh, PA	76.8	+4.7
Bethel, AK	60.3	+5.6	Akron, OH	76.3	+4.7
Eau Claire, WI	76.3	+5.4	Lander, WY	75.4	+4.7
McGrath, AK	63.7	+5.4	Milwaukee, WI	75.4	+4.7
Worland, WY	77.0	+5.2	Sheridan, WY	74.5	+4.7
Fargo, ND	75.9	+5.2	Binghamton, NY	73.6	+4.7
Flint, MI	75.4	+5.2	Fresno, CA	85.5	+4.5
Alpena, MI	71.6	+5.2	Marysville/Yuba Co., CA	83.1	+4.5
Red Bluff, CA	87.3	+5.0	Saginaw, MI	75.6	+4.5
Sacramento, CA	80.6	+5.0	Houghton Lake, MI	71.4	+4.5

TABLE 4. JULY AVERAGE TEMPERATURES 2.0°F OR MORE BELOW NORMAL.

Station	Degrees F Mean	Dep	Station	Degrees F Mean	Dep
Midland, TX	77.7	-4.0	El Paso, TX	80.2	-2.5
Dalhart, TX	73.8	-3.8	Abilene, TX	81.7	-2.3
San Angelo, TX	80.8	-3.1	Ketchikan, AK	55.9	-2.3
Amarillo, TX	75.7	-3.1	Wink, TX	81.3	-2.2
Junction, TX	80.6	-2.9	West Plains, MO	75.6	-2.2
Carlsbad, NM	79.7	-2.9	Gage, OK	79.5	-2.0
Clovis/Cannon AFB, NM	74.8	-2.7	Annette Island, AK	55.9	-2.0

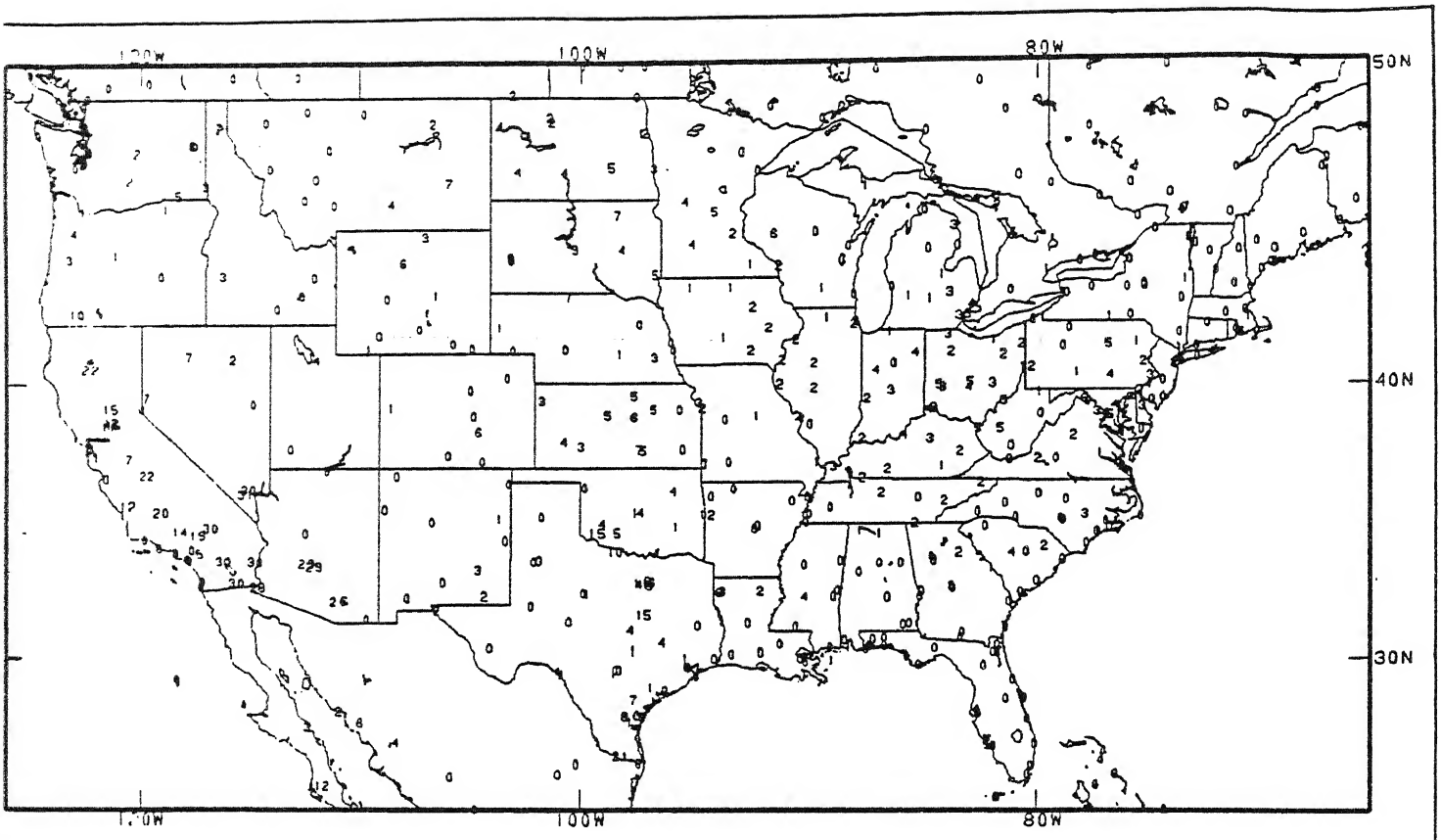


Figure 5. Number of days the temperature equaled or eclipsed 100°F during July, 1988. California, Oregon, the northern half of the Great Plains, Midwest, and mid-Atlantic areas endured several days in the one hundreds.

TABLE 6. RECORD JULY AVERAGE TEMPERATURES.

Station	AvgT(°F)	Nml AvgT	Dep Nml AvgT	Type	Records Began
Reno, NV	75.2	69.4	+5.8	HIGHEST	1947
Bethel, AK	60.3	54.7	+5.6	HIGHEST	1924
McGrath, AK	63.7	58.3	+5.4	HIGHEST	1942
Fargo, ND	75.9	70.7	+5.2	HIGHEST	1947
Sacramento, CA	80.6	75.6	+5.0	HIGHEST	1878
Akron, OH	76.3	71.6	+4.7	HIGHEST	1944
Lander, WY	75.4	70.7	+4.7	HIGHEST	1947
Charleston, WV	78.6	74.5	+4.1	HIGHEST	1951
Phoenix, AZ	96.3	92.3	+4.0	HIGHEST	1877
Newark, NJ	80.5	76.8	+3.7	HIGHEST	1929
Dayton, OH	78.4	74.7	+3.7	HIGHEST	1951
Beckley, WV	72.7	69.4	+3.3	HIGHEST	1951
Talkeetna, AK	61.2	58.1	+3.1	HIGHEST	1951
Homer, AK	55.8	52.9	+2.9	HIGHEST	1951
San Fransisco, CA	64.2	62.2	+2.0	HIGHEST	1851

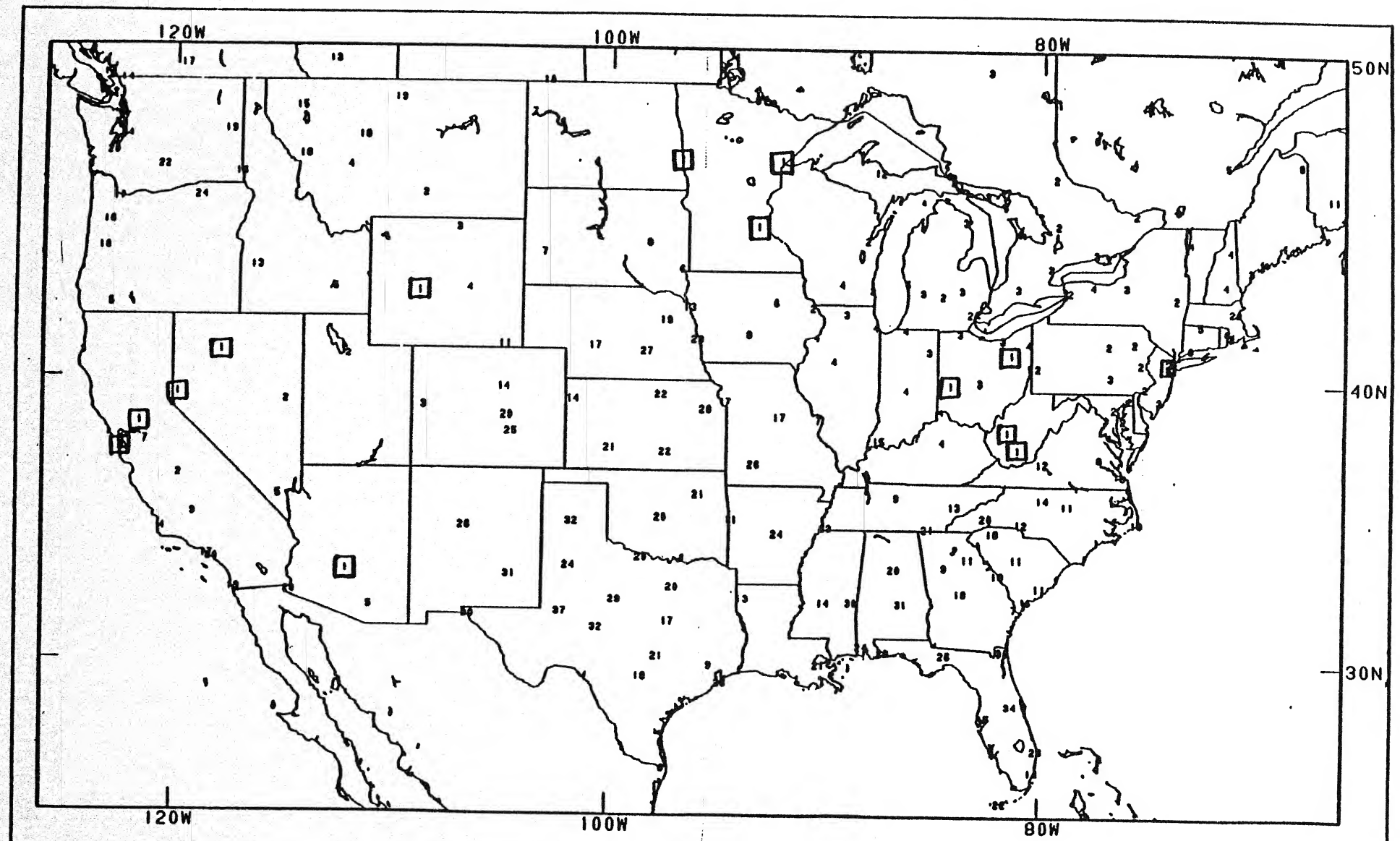


Figure 6. July 1988 temperature rankings since 1951 (38 years). Plotted values represent the July 1988 temperature rank of a station where 1-maximum (warmest) and 38-minimum (coolest). Boxed rankings indicate record values over the past 38 years, however, they may not represent all-time records. For historical records, refer to Table 6. Many locations observed one of their top five warmest Julys in recent times.

TABLE 5. RECORD JULY TOTAL PRECIPITATION.

Station	Total (In.)	Normal (In.)	Pct of Normal	Record Type	Records Began
Montgomery, AL	9.99	4.76	209.9	HIGHEST	1951
Newark, NJ	9.94	3.83	259.5	HIGHEST	1944
Hartford, CT	8.43	3.07	274.6	HIGHEST	1947
Washington/Dulles, VA	7.12	3.49	204.0	HIGHEST	1963
Concord, NH	6.53	2.93	222.9	HIGHEST	1951
Peoria, IL	0.33	3.99	8.3	LOWEST	1856
Sheridan, WY	0.05	0.94	5.4	LOWEST	1908

TABLE 7. RECORD JULY EXTREME TEMPERATURES.

Station	Extreme (Degree F)	Record Type	Records Began	Station	Extreme (Degree F)	Record Type	Records Began
Fargo, ND	106	HIGHEST	1942	Buffalo, NY	97	HIGHEST	1943
Sheridan, WY	106	HIGHEST	1940	Quillayute, WA	97	HIGHEST	1966
Waterloo, IA	105	HIGHEST	1949	Sault Ste. Marie, MI	97	HIGHEST	1941
Minneapolis, MN	105	HIGHEST	1938	Duluth, MN	97	HIGHEST	1941
Washington, DC	104	HIGHEST	1941	Syracuse, NY	97	HIGHEST	1941
Baltimore, MD	104	HIGHEST	1951	Asheville, NC	96	HIGHEST	1965
Charleston, SC	104	HIGHEST	1948	Erie, PA	96	HIGHEST	1953
San Fransisco, CA	104	HIGHEST	1928	Muskegon, MI	96	HIGHEST	1940
Cincinnati, OH	103	HIGHEST	1948	Beckley, WV	94	HIGHEST	1963
Pittsburgh, PA	103	HIGHEST	1953	Roswell, NM	59	LOWEST	1973
Toledo, OH	103	HIGHEST	1956	El Paso, TX	57	LOWEST	1939
Lexington, KY	103	HIGHEST	1945	New York/La Guardia, NY	56	LOWEST	1941
Huntington, WV	102	HIGHEST	1962	Wilmington, NC	55	LOWEST	1952
Dayton, OH	102	HIGHEST	1944	Washington, DC	54	LOWEST	1941
Evansville, IN	102	HIGHEST	1940	Boston, MA	50	LOWEST	1936
Chicago/O'Hare, IL	102	HIGHEST	1958	Knoxville, TN	49	LOWEST	1942
Detroit, MI	102	HIGHEST	1959	Bridgeport, CT	49	LOWEST	1948
Rochester, MN	102	HIGHEST	1961	Providence, RI	48	LOWEST	1954
Akron/Canton, OH	101	HIGHEST	1949	Roanoke, VA	47	LOWEST	1948
Flint, MI	101	HIGHEST	1942	Asheville, NC	44	LOWEST	1965
Columbus, OH	100	HIGHEST	1939	Parkersburg, WV	44	LOWEST	1888
Youngstown, OH	100	HIGHEST	1943	Akron/Canton, OH	43	LOWEST	1949
Lansing, MI	100	HIGHEST	1949	Atlantic City, NJ	42	LOWEST	1943
Grand Rapids, MI	100	HIGHEST	1964	Beckley, WV	41	LOWEST	1963
Marquette, MI	100	HIGHEST	1979	Toledo, OH	40	LOWEST	1956
Binghamton, NY	98	HIGHEST	1952	Marquette, MI	35	LOWEST	1979
Rochester, NY	98	HIGHEST	1941	Duluth, MN	35	LOWEST	1941
International Falls, MN	98	HIGHEST	1939